

Research Note 84- 45

INDIVIDUAL AND SITUATIONAL CONTRIBUTIONS TO WORK ROLE PERCEPTIONS

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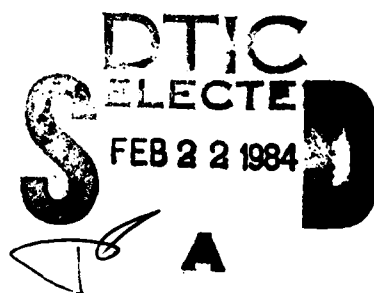
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Further analyses showed that individuals clustered on the basis of the similarity of their task perceptions also performed differently. In addition, the proportion of their performance variance associated with motivation as defined by Expectancy theory also varied according to group membership based upon similar perceptions. This report is seventh in a 1975-1976 series entitled "Sources and Effects of Accurate Work Perceptions."

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## Individual and Structural Contributions to Work Role Perceptions

The work role behavior of an individual results from some function of properties of the work environment and characteristics of the individual on the job (Vroom, 1964). The work environment presents to the individual a complex set of stimuli to which he responds with varying degrees of effectiveness. Although his effectiveness depends to some extent upon the availability of needed equipment or other conditions on the job, it also depends upon factors specifically attributable to him. The most notable individual factors are those of his capabilities for accomplishing the job at hand (ability) and his perceptions of the job. Within the latter, the most relevant perceptions are those of the required job behaviors required in the job setting and of the rewards associated with his actions in that setting.

The present focus is on understanding the perceptual process in the work environment for perceptions form a critical link in the establishment of effective work behavior. It has been argued by Ilgen and his colleagues (Ilgen, Campbell, Fisher, and Peters, 1975, 1976) that perceptions of the work environment influence both the amount of effort an individual puts into work behavior and the direction in which that effort is expended. Effort expenditure has been shown to be related to the extent to which the individual perceives his effort to be associated with the attainment of valued outcomes. Research on Expectancy theory of work motivation clearly demonstrates that such perceptions do influence effort (see Mitchell, 1974, for a review and critique of the expectancy theory literature). On the other hand, if the effort is expended on inappropriate behaviors, it is not likely

to lead to higher performance. Therefore, a second set of perceptions dealing with the behaviors in which to direct effort is a necessary condition for effective performance. Data from both field and simulated organizational settings have supported this conclusion (Greene and Organ, 1973; Ilgen, et. al., 1975 ; Lawler and Suttle, 1973; Terborg, 1975).

Given the central function of role perceptions in the influence of work role behavior, it is necessary that those factors which affect work role perceptions be understood. Work role perceptions, like all other perceptions, are a function of the stimulus, in this case objective features of the job environment, and the perceiver's set with which he views the stimuli. However, typically, research on the behavior of individuals in organizations has concentrated on either the stimulus or on the individual perceptions. Whichever dimension is not treated is either assumed to be isomorphic with the measured one or is used in the discussion section as the source to which error variance is attributed. For example, studies of Expectancy theory usually measure subjective estimates of the contingency between performance and rewards assuming that the objective environment is isomorphic with the reported subjective one. Yet, it has been demonstrated that perceptions of pay policies (Lawler, 1967) and reward contingencies (Ilgen, Campbell, Fisher, and Peters, 1976), performance feedback (Hackman and Lawler, 1971), and leader behavior (Ilgen and Fujii, in press) often are quite dissimilar from what actually is present on the job. As a result, an attempt to change the objective environment under the assumption that the perceived environment will change similarly may be misleading. Likewise, to infer that the objective job environment actually exists as it is perceived by job incumbents can lead to very inaccurate descriptions (Ilgen and Fujii, in press).

The purpose of the present study was to investigate the influence of both individual and situational factors on individual perceptions about those behaviors required for successful performance in a simulated work setting. The perceptions of primary concern were those of the behaviors the individuals felt were most important for successful job performance. In order to assess variance in perceptions due to individuals and due to task settings, the same individuals were presented with four tasks or exercises in an assessment center. Contribution of task and individual factors were analyzed by the use of a three-mode factor analysis (Tucker, 1966).

### Method

#### Research Setting

Data were collected from participants in an executive assessment center operated by a state civil service commission for its employees. All state employees who participated in the center over an eight month time period were included in the sample. Approximately twelve participants (hereafter referred to as candidates) participated in a center, and centers were conducted every two to three weeks during the eight month time period.

The center was designed to serve two functions. First, it was to provide an assessment of upper-level middle managers to be used as one of the inputs into promotional decisions. The managers who went through the center were eligible or would soon be eligible for promotion to some of the highest level civil service jobs in the state. As these positions opened up, they were assessed, using a job analysis procedure designed to assess the extent to which sixteen behaviorally oriented dimensions assessed in the center were present in the job. Then, to fill the position, a search of those who had performed well on those dimensions in the center defined

a pool of applicants considered for the position opening. Thus, performance in the center was to be a major input into the decision of who to place in jobs as they opened up. As the result, the participants were highly motivated to perform well in the center.

The second purpose of the center was to provide feedback to the candidates who participated in it for their own aid in career development. They were given a written report following the center and were given the opportunity to meet with assessment center staff to discuss their evaluation if they desired such a meeting. Finally, after waiting a minimum of one year, they were allowed to go through the center again.

### Participants

Candidates: Data were collected from 127 state employees who were candidates in the center. During the time period covered by the study, a few participants in the centers were not part of the state's civil service, but were sent by other organizations to be assessed. Also, a few were being assessed for a second time. Both these groups were eliminated from the sample because of their possible differences in motivation and/or in experience with assessment centers.

The candidates all held upper-level middle management positions within the state system. Most were college graduates and many held advanced degrees or professional certifications. Almost all had been with the state at least fifteen years and were in their late thirties or forties. All were aware that their performance in the center would have a significant influence upon their selection for higher level positions than they currently held. Participation in the center was voluntary. Candidates were selected for the center only if they requested to be sent to it. However, given the fact that the center's role in future promotional decisions was well known, the



voluntary nature of their decision to participate was certainly restricted.

Assessors: For each center, twelve candidates participated and were assessed by six assessors. These assessors were civil servants in executive positions immediately above the level of those who were going through the center, although care was taken to insure that no candidate was assessed by his own immediate superior. Assessors were trained by first having them go through the center as a participant. Special centers were run strictly for assessors. Then following this, they observed other assessors going through a center as participants. During the second center, they rated their own level people and learned the assessment procedure with the aid of the permanent staff of the center. Approximately one-hundred seventy-five of the highest level executives were available and, once trained, formed a pool from which the six assessors for any given center were selected.

Assessment Center Staff: The state employed one full time technical staff member solely responsible for the operation of the center. This individual had received extensive training in the procedures by an outside firm that was brought in to aid the agency in setting up the center. Also available were one or two additional staff members during the two day time period when a center was being conducted and during the three days following the center when assessors were preparing reports on each of the participants.

#### Conduct of Center

Candidates attended the center for two full days. During that time, they were assessed on six separate sets of exercises and/or paper-and-pencil tests. The present research was based upon only four of the exercises. These four are explained in detail below.

- (1) Assigned Role Group Discussion: Six person groups were assigned the roles of members of a city council. Council members represented

different interest groups, such as the city street commission, and were required to distribute a fixed amount of funds to the different agencies represented by the six group members. The participants had to reach agreements on what projects to support which meant each had to present the case of his/her special interest and then bargain with the others to reach a group decision on the allocation of a fixed amount of money.

- (2) **Non-Assigned Role Group Discussion:** Six person groups were given four short cases and were to act as a group of consultants formed to recommend courses of action to deal with the problems. None of the group members were assigned any specific roles, and the assessors observed how each participant entered into the discussion and contributed to the group solution to each problem. The problems dealt with issues that could be expected to be encountered in a state civil service system. For example, the group may have been told that a large office of a particular state agency located in a large city a considerable distance from the state capitol was to be transferred to the state capitol. The group's problem would be to handle the placement and/or transfer of employees holding positions in the present location.
- (3) **In-Basket Exercise:** A typical in-basket was tailored to a state government system. Items included relationships with departmental supervisors, subordinates, and peers, representatives of other departments, representatives of executive and legislative branches, interactions with the public, and with the news media. The candidate was asked to assume the role of someone who had been placed on a job due to the unexpected death of the former job holder, and the candidate proceeded through his in-basket. Approximately 3-1/2 to 4 hours were spent on the task. The task was then coded by an assessor. Following the coding, a one-half hour interview

was held with the candidate to clarify responses he had made to the in-basket.

- (4) **Analysis Problem:** The analysis problem was in two parts. First, the candidate was given a considerable amount of data regarding a state agency's field operation. He/she had to go through the information and write up a series of recommendations. From the written recommendations, he/she then had to prepare an oral presentation, and make that oral presentation. The presentation was made to at least two assessors who acted as adversaries and took issue with many of the recommendations, requiring that the candidate respond orally to the issues. Each part of the analysis problem, preparation of the written recommendations and preparation of and delivery of the oral presentation took approximately 2-1/2 hours.

### Measures

Task Attribute Dimensions: The center was designed to assess managers on the sixteen behaviorally oriented dimensions listed in Figure 1. However, each exercise was not designed to tap each dimension: the exercises varied in the extent to which various dimensions were important for successful performance on them. Therefore, the Exercise Requirement Scale was designed to obtain ratings of the candidate's perceptions of what were the important behaviors he/she was to have displayed on each exercise. These ratings provided a measure of what the candidate perceived to be the required behaviors in the task setting provided on an exercise.

To develop items for the scale to measure the sixteen behavioral measures, a large set of items were generated and three judges sorted the items into categories.

Figure 1: Sixteen Behaviorally Oriented Dimensions  
Assessed in the Center

1. Decision-Making. Extent to which conclusions reached reflect considerations of the evidence at hand, the alternatives available, and the potential ramifications.
2. Decisiveness. Readiness to make decisions and render judgment when necessary.
3. Initiative. Active efforts to influence events rather than passive acceptance.
4. Leadership. Effectiveness in bringing a group to accomplish a task and in getting ideas accepted.
5. Management Control. Appreciation of need for controls and maintenance of control over processes.
6. Oral Communications. Effectiveness of expression in individual (one-on-one) and group situations.
7. Oral Presentation. Effectiveness of expression of ideas or facts, planned or unplanned, in a speaker-to-audience setting.
8. Planning and Organization. Effectiveness in approaching, arranging and relating work in a systematic and situationally-appropriate manner.
9. Problem Analysis. Effectiveness in identifying, seeking out and relating data pertinent to the solution of a problem.
10. Responsiveness. Appreciation of and positive reaction to the needs and concerns of the various publics served.
11. Risk-Taking. Extent to which calculated and logically defensible risks are taken.
12. Sensitivity. Awareness and consideration of the needs and feelings of others.
13. Stress Tolerance. Stability of performance under pressure and opposition.
14. Tenacity. Tendency to stay with a position or line of thought until the desired objective is achieved or is no longer reasonably attainable.
15. Use of Delegation. Effective assignment of decision-making authority and accountability.
16. Written Communication. Effectiveness of expression in writing; correctness of grammar, syntax and other basic English items.

Three sources were used to develop a pool of items to define the sixteen behavioral dimensions for the scale. First, members of the center's staff provided descriptive items. Members of the research staff also generated a set of items. Finally, undergraduates who had had no previous experience with assessment centers participated in an exercise for one hour. They were then stopped and a one-half hour discussion of the task was held by a member of the research staff. The discussion centered on the behaviors they, as participants, felt were important to do well on the exercise. These discussions provided the third source of items. Each of the four exercises studied was administered to two groups of undergraduates in this fashion.

The items were then sorted back into the sixteen categories by three raters. Due to the similarity of several of the dimensions, only eight dimensions survived this sorting process. These eight dimensions comprised the scale. Figure 2 lists the eight dimensions with the items defining them.

Each item was rated on its importance for successful task performance. Pilot work with the scale showed that most candidates rated almost all behaviors high on importance. Therefore, a forced distribution was used which spread out the ratings but still did not create an ipsative measure. The fifty items were distributed into seventy categories along an importance dimension. The scale is illustrated in Figure 3.

The Exercise Requirement Scale was filled out by the candidates immediately following the time period they worked on the exercise in question. It was also completed for each exercise by the assessors. A perceived importance score was calculated for each of the eight dimensions within each of the four exercises for a total of thirty-two scores.

Performance Ratings: The six assessors assigned to a center observed the performance of each candidate on at least one of the exercises and recorded

Figure 2: Items and Attribute Dimensions for Exercise Requirement Scale

I. Decision-Making

- a. Explain the expected result(s) or impact of a decision; both positive and negative effects.
- b. Propose some solution to a pressing problem even though all the facts bearing on it are not known.
- c. Explain why a decision is supported or contradicted by available facts.
- d. Challenge proposed solutions which only superficially respond to the problem.
- e. Make decisions which address the "heart" of the problem or issue.
- f. Offer alternatives for others to consider in decision-making situations.
- g. Explain which facts should be considered in making a decision.

II. Decisiveness

- a. Take a definite position on the issues presented.
- b. Be willing to cast a minority vote.
- c. Clearly state my view point so others know exactly where I stand on an issue.
- d. Firmly commit myself to a course of action.

III. Initiative

- a. Improvise if a solution is not readily apparent.
- b. Tell others what to do if they appear unable or unwilling to act.
- c. Accomplish more than is required.
- d. Suggest new ideas to be considered.
- e. Be one of the first to take action or recommend change.
- f. Frequently express my ideas; speak out often.

IV. Oral Communications

- a. Present my ideas in a persuasive manner.
- b. Speak fluently, indicating a good command of the language.
- c. Maintain eye contact with my listener(s).
- d. Express my ideas clearly and precisely so my meaning is not in doubt.
- e. Develop my ideas point by point; avoid rambling.
- f. Be concise.
- g. Speak with confidence and authority.

V. Problem Analysis

- a. Point out erroneous conclusions or statements drawn by others.
- b. Request additional information needed before arriving at a decision.
- c. Define the major element(s) of a problem.
- d. Ask questions which help clarify the problem.
- e. Cite pertinent data references to support a point or position.

Figure 2 (Continued)

- f. Tie together information which is logically related.
- g. Distinguish between causes and symptoms in a problem.

#### VI. Planning and Organizing

- a. Meet specified deadlines, due dates; resolve conflicting demands on my time.
- b. Develop an overall approach and strategy for accomplishing the task.
- c. Establish proper workflow relationships between units or individuals.
- d. Identify and clarify goals and objectives.
- e. Review all the material quickly and then choose to do those things which are most important.
- f. Present my ideas in a manner which demonstrates an orderly and systematic approach.
- g. Establish and adhere to a schedule that maximizes the time allotted to the assigned task.

#### VII. Leadership

- a. Try to resolve conflicting points of view.
- b. Have the group members direct their remarks to me for my reaction.
- c. Frequently summarize points that have been made to refocus the discussion.
- e. Keep the group on the central issue or problem.
- f. Get my ideas included in final group decision.
- g. Establish and maintain a procedural framework for discussion, e.g., set time limits.

#### VIII. Interpersonal Relations (Sensitivity)

- a. Be tactful when I differ with others.
- b. Define outcomes which I expect in assigning work to others.
- c. Establish a friendly tone in written and verbal communications.
- d. When someone has a good idea, tell the person so.
- e. Help sell the ideas of others.
- f. Explain why my recommendation has the best chance of succeeding.

**Figure 3: Scale used to Rate the Perceived Importance of Fifty Behaviors  
for Successful Completion of an Exercise**

Unimportant      Somewhat Important      Important      Very Important

Place the number of each item on the opposite page in one of the boxes along this scale.



his observations on recording forms developed through extensive work with assessment centers by Development Dimensions. For example, on the city council exercise, each assessor observed two of the six candidates in a group. Then, when the candidate worked on the leaderless group discussion, an assessor would observe a different set of two candidates. Once all assessor observations were recorded, the assessor reports were collated by the assessment center staff. Then, working with two groups of three assessors, each group prepared a final report on six of the twelve candidates. The final report consisted primarily of a final rating on each of the sixteen dimensions of Figure 1 and evaluative comments designed as feedback to be useful for career development from the candidate's standpoint. Preparation of these ratings took approximately one and one-half days for each six candidates.

To arrive at the final rating, each assessor was provided with the ratings for each exercise on the performance dimensions from the sixteen that were relevant to that exercise. These ratings were made by the assessor(s) who actually observed the candidate on the task. After reading the material on each exercise for a given candidate, the assessor rated him/her on all sixteen dimensions. Following this rating, the assessment staff and the three assessors discussed the candidate on each dimension explaining why they had rated the individual as they did. This discussion was followed by a second rating which usually led to an extremely similar set of ratings between the three raters. The final rating on a dimension was based upon the average across the three assessors of this second rating. From this rating, the final report was prepared.

Individual Difference Measures: Individual difference measured obtained from the candidate can be classified into three categories: demographic

variables, and personality test variables. The demographic data consisted of: age, educational level, and number of years with the civil service. Personality traits were measured on the Ghiselli Self-Descriptive Inventory (Ghiselli, 1971) which measured thirteen personality traits by presenting the individual with sixty-four adjective pairs from which he/she selects the one that more closely describes him/her. The thirteen dimensions are: Supervisory Ability, Intelligence, Initiative, Self-Assurance, Decisiveness, Masculinity/Femininity, Maturity, Affinity, Achievement Motivation, Self-Actualization, Need for Power, Need for Financial Reward, and Need for Security.

Expectancy Theory Measures: Three variables commonly measured to assess perceptions about the over motivational properties of the setting were obtained from each candidate following the initial corientation on the first day of the center. The first of these, the expectancy measure, asked the candidate to make nine subjective probability estimates. He estimated the likelihood, as he saw it, that low, average, or high performance on his part during the two day center would lead to low, average, or high performance in the center. The subjective probability itself was rated on an eleven point scale with anchors from 0-10 chances in 10. For purposes of later analysis, the motivational properties of the expectancy portion of the job perceptions was defined as the difference between the candidate's estimate of the subjective probability that low effort would lead to high performance (see Ilgen and Peters, 1975 for the rationale behind the selection of the measures).

The second measure was termed an instrumentality. This measure reflected the degree of association between performance and the attainment of each of a set of outcomes. Candidates rated their subjective probability that high performance in the center would lead to each outcome and the subjective probability that low performance would lead to the same outcomes. The same point scale was used for this rating as for the expectancy measure. Figure 4 lists the outcomes used. These were generated from interviews with the assessment center staff and from candidates in the centers. For motivational purpose, the instrumentality of performance for the attainment of a given outcome was defined as the difference between the subjective probability that high performance leads to the outcome and that of low performance leading to it.

The final motivational perception was the valence of each of the seventeen outcomes. In this case, the candidate rated the desirability of each outcome on an eleven point scale ranging from very undesirable through neutral to very desirable.

An index of motivational force was constructed from these three measures. It was assumed to reflect the extent to which the individual perceived that he/she should exert effort in the center in order to perform highly. This index was defined as the product of the expectancy term multiplied by its corresponding valence. These products were summed over all seventeen outcomes before multiplying the sum of the products by the expectancy term.

### Three-Mode Factor Analysis

It will be recalled that the perceptions of the task attributes were collected from 127 candidates on each of four exercises. Therefore, the basic set of data was a  $127 \times 4 \times 8$  matrix with 127 persons, four exercises, and eight task attribute dimensions. Given this data matrix, the major

Figure 4: Outcomes Used for Instrumentality and Valence Ratings

1. High self-respect.
2. Growth and development in my career field.
3. Having high prestige within the state civil service system.
4. Working very hard.
5. Being highly respected by my supervisor.
6. Being highly respected by my peers.
7. Feeling my job is secure.
8. Feeling bored with my job.
9. Having a feeling of tenseness that carries over to my home.
10. Receiving constructive feedback from my supervisor.
11. Doing challenging work.
12. Feeling I know my job well.
13. Experiencing a feeling of accomplishment.
14. Improvising my chances for promotion.
15. Getting a raise.
16. Being viewed as top management potential by others in the system.
17. Being closely supervised.

purpose of the study was to explore the contributions to perceptions of persons, exercises, and task attributes, simultaneously. To do this, a three-mode factor analysis was applied (Tucker, 1966).

The three-mode factor analysis model approximates the data matrix from factor matrices corresponding to different modes. That is, perceptions of the task on a given task dimension are partitioned as follows:

$$X_{ijk} = [{}_jA_p \times {}_kE_q] (p \cdot q) G_m S_i$$

where all elements are matrices and A is a matrix of attribute factors, E is a matrix of exercise factors, S is a matrix of subject factors, and G is a core matrix which interrelates A, E, and S. The subscripts i, j, and k refer to the observation in each mode.

Attributes, exercises, and individual dimensions are each represented in A, E, and S, respectively as is the interrelationships among the three sources of variance in perceptions of task demands. The dimensionality of attribute dimension measures (A) is investigated by factor analyzing the sums of squares and cross products matrix (SSCP) of 508 observations (127 subjects within each of the 4 exercises) of the eight attribute measures. Likewise, the exercise dimensions are based on factoring the SSCP matrix of 1016 observations and the individual dimensionality by factoring the SSCP matrix of 127 observations of 32 variables.

## Results

### Perceptual Dimensions

Task Attribute Dimensions: The clustering of the eight exercise or task dimensions influencing exercise performance was assessed by factoring the SSCP matrix of task dimensions over the person-exercise combinations. For this and subsequent factor analyses, the data were rescaled as deviation

scores around the grand mean of the distribution.

Table 1 shows the latent roots and the percent of variance accounted for by each successive factoring of the task attributes when deviations were collapsed over people and over the four exercises. On the basis of the roots and the interpretability of resulting factor solutions, five factors were retained and a varimax rotation was performed. The five factor solution accounted for 89.42% of the explainable variance. Table 2 presents the loadings from the varimax rotation of the five factor solution. It can be seen from Table 2 that the first factor was almost entirely an interpersonal relations factor. None of the other seven dimensions loaded on it. Factor two contained those attributes concerned with reaching a decision and preparing to carry it out. The three attributes loading highly on it were: Decision Making, Problem Analyses, and Planning and Organizing. Factor three was primarily a leadership factor with some evidence for the conduct of the leadership behavior through people by the use of oral communications and a low concern for the task demands for planning and organizing. Decisiveness loaded highest on factor four along with Oral Communication, indicating the association between acting decisively, then communicating in a precise and clear manner. Factor five was an initiative factor with Oral Communication loading negatively on it.

Exercise Space Dimensions: Factoring the SSCP matrix of the four exercises collapsing across exercise behavioral dimensions and person yielded two interpretable factors. Table 3 presents the roots for each of the four solutions and Table 4 presents the Varimax rotated eigenvectors. The two dimensional solution accounted for 73.26% of the explainable variance. The first dimension of the two dimensional solution was defined almost entirely by the In-basket. In this exercise, the individual worked alone and communicated

Table 1  
Variance Accounted for by an n-Dimensional  
Solution of the Task Attributes

| n-Dimensional<br>Space | Roots   | Percentage of<br>Variance | Cumulative<br>Percentage |
|------------------------|---------|---------------------------|--------------------------|
| 1                      | 4652.19 | 30.24                     | 30.24                    |
| 2                      | 3759.86 | 24.41                     | 54.68                    |
| 3                      | 2651.48 | 17.24                     | 71.92                    |
| 4                      | 1761.69 | 11.45                     | 83.37                    |
| 5                      | 931.03  | 6.05                      | 89.42                    |
| 6                      | 673.41  | 4.38                      | 93.80                    |
| 7                      | 519.27  | 3.38                      | 97.18                    |
| 8                      | 434.28  | 2.82                      | 100.00                   |

Table 2  
 Varimax Rotated Eigenvectors for the 5-Dimensional  
 Approximation of the Task Attribute Space

| FACTOR NAMES AND LOADINGS           |                                 |                                  |                 |                               |            |
|-------------------------------------|---------------------------------|----------------------------------|-----------------|-------------------------------|------------|
| Exercise Behavioral<br>Requirements | Inter-<br>Personal<br>Relations | Problem<br>Solving<br>and Action | Leader-<br>ship | Decisions<br>and<br>Directing | Initiative |
| 1. Decision-Making                  | -.05                            | .64                              | .04             | .00                           | .07        |
| 2. Decisiveness                     | -.03                            | -.08                             | -.07            | .84                           | .11        |
| 3. Initiative                       | .01                             | .04                              | .10             | .08                           | .90        |
| 4. Oral Communications              | .04                             | .09                              | .32             | .45                           | -.39       |
| 5. Problem Analysis                 | .00                             | .50                              | .19             | -.19                          | -.09       |
| 6. Planning and Organizing          | .09                             | .57                              | -.38            | .21                           | .01        |
| 7. Leadership                       | .02                             | .07                              | .84             | .02                           | .07        |
| 8. Interpersonal Relations          | .99                             | -.02                             | .01             | -.01                          | .01        |



Table 3  
Variance Accounted for by an n-Dimensional Solution  
of the Exercise Space

| n-Dimensional<br>Space | Roots   | Percentage<br>of<br>Variance | Cumulative<br>Percentage |
|------------------------|---------|------------------------------|--------------------------|
| 1                      | 7006.12 | 45.54                        | 45.54                    |
| 2                      | 4262.69 | 27.72                        | 73.26                    |
| 3                      | 2340.35 | 15.21                        | 88.47                    |
| 4                      | 1773.05 | 11.53                        | 100.00                   |

Table 4  
Varimax Rotated Eigenvectors for 2-Dimensional  
Approximation of the Exercise Space

| Exercises                  | In-Basket | Interpersonal<br>Interaction<br>Exercises |
|----------------------------|-----------|---|
| 1. Non-Assigned Role Group | -.26      | .70                                       |
| 2. In-Basket               | .95       | .07                                       |
| 3. Assigned Role Group     | .11       | .45                                       |
| 4. Analysis Problem        | .11       | .53                                       |

with others in the simulated organizations entirely by memo or other written messages. There was no face-to-face interpersonal interaction. The second dimension included the remainder of the exercises, all of which had a large component dealing with interacting face-to-face with others and making decisions or reacting to the verbal response of others. The interaction component was most evident in the two group exercises. The problem analyses exercise, on the other hand, had only one part of it associated with a need for interaction. This part involved the verbal presentation to a group of assessors of the plan of action the candidate had advocated to deal with some problem. In this presentation, he/she was aware of the fact that the presentation would be questioned and that it would have to be defended on-the-spot.

Individual Dimensions: Table 5 presents a partial listing of the latent roots and a percent of variance associated with them which resulted from the solutions of the SSCP matrix for individuals based upon 127 observations of 32 (i.e.,  $4 \times 8$ ) measures. A three-dimensional solution was chosen which accounted for 64.10% of the variance.

To investigate the characteristics of each of the person dimensions, it was necessary to refer to the core matrix presented in Table 6. Recall that the core matrix is that matrix which interrelates each of the three modes and thus considers the interaction among the three modes. To investigate the patterns of perceptions of exercise requirements over different exercises for each of the three person dimensions, different kinds of persons may be summarized by Tucker's technique of representing "idealized persons" by hypothetical factor loadings which represent each of the three person dimensions. To do this, the idealized person is represented by a vector with zeros on all dimensions but the one of interest. This vector then

Table 5  
 Variance Accounted for by an n-Dimensional  
 Solution of the Person Space

| n-Dimensional<br>Space | Roots   | Percentage<br>of Variance | Cumulative<br>Percentage |
|------------------------|---------|---------------------------|--------------------------|
| 1                      | 6706.15 | 43.59                     | 43.59                    |
| 2                      | 1786.80 | 11.62                     | 55.21                    |
| 3                      | 1367.60 | 8.89                      | 64.10                    |
| 4                      | 915.24  | 5.95                      | 70.05                    |
| 5                      | 388.66  | 3.83                      | 73.88                    |
| 6                      | 415.03  | 2.70                      | 76.57                    |
| 7                      | 384.64  | 2.50                      | 79.07                    |
| 8                      | 308.98  | 2.12                      | 81.20                    |
| 9                      | 270.10  | 2.01                      | 83.20                    |
| 10                     | 243.25  | 1.76                      | 84.96                    |
| .                      | .       | .                         | .                        |
| .                      | .       | .                         | .                        |
| .                      | .       | .                         | .                        |
| 127                    | 0.00    | 0.00                      | 100.00                   |

Table 6  
Varimax Rotated Core Matrix

| Exercise<br>Dimension | Exercise<br>Behavior<br>Dimensions | <u>Person Dimensions</u> |                |                |
|-----------------------|------------------------------------|--------------------------|----------------|----------------|
|                       |                                    | S <sub>1</sub>           | S <sub>2</sub> | S <sub>3</sub> |
| E <sub>1</sub>        | P <sub>1</sub>                     | -17.01                   | -15.52         | -16.28         |
|                       | P <sub>2</sub>                     | -10 17                   | -12.27         | -13.19         |
|                       | P <sub>3</sub>                     | 7.10                     | - 5.06         | - 3.48         |
|                       | P <sub>4</sub>                     | 16.72                    | - 1.24         | 7.02           |
|                       | P <sub>5</sub>                     | 22.22                    | -18.91         | -25.71         |
| E <sub>2</sub>        | P <sub>1</sub>                     | 25.75                    | - 0.63         | -20.75         |
|                       | P <sub>2</sub>                     | 23.29                    | 23.47          | 12.89          |
|                       | P <sub>3</sub>                     | - 5.86                   | - 1.06         | 17.19          |
|                       | P <sub>4</sub>                     | 3.81                     | 25.29          | - 8.31         |
|                       | P <sub>5</sub>                     | -23.59                   | -10.39         | -27.17         |

represents all persons who load highly on that dimension. For the present analysis, each person dimension was represented by a  $1 \times 3$  column vector with all entries other than the one for the dimension of interest equal to zero.

The characteristic preceptions of the idealized person may be determined by matrix operations presented by Tucker (1966). This procedure pre-multiplies the rotated core matrix (Table 6) by the rotated task attribute matrix (Table 2) and post multiplies it by the idealized person vector (the transpose of  $[1, 0, 0]$  for the first person dimension,  $[0, 1, 0]$  for the second person dimension, and  $[0, 0, 1]$  for the third person dimension). The results of these matrix manipulations provided, for each person dimension, a vector with entries which may be considered indications of the level of perceived importance of task attribute dimensions for each of the two general types of exercises for the idealized person. Table 7 presents the three idealized person dimensions resulting from these matrix operations.

A person's loading on the first subject factor corresponds to one who saw taking initiative as important on the In-basket and also emphasized oral communication. Although no oral communication was possible on the In-basket, the high loading of this attribute more than likely reflects those items used to define it which could apply to any communication--oral or written. These items tapped such topics as: "be precise," "present ideas persuasively," "present ideas clearly," and "avoid rambling." On exercises requiring interaction with others, these individuals emphasized interpersonal relations and believed they should carefully plot out their behavior while at the same time they did not perceive a need to take an initiative in these settings. In many respects, they tended to see the interpersonally oriented tasks as requiring social facilitation and planning

**Table 7**  
**Characteristic Perceptions Associated with Each of the**  
**Three Person Dimensions**

|  | Exercise Behavioral<br>Dimensions | First<br>Person<br>Dimension | Second<br>Person<br>Dimension | Third<br>Person<br>Dimension |
|--|-----------------------------------|------------------------------|-------------------------------|------------------------------|
| Individual<br>Exercise<br>(In-Basket)      | Decision Making                   | - 6.94                       | - 8.59                        | - 9.57                       |
|  | Decisiveness                      | 12.43                        | - 1.33                        | 4.86                         |
|  | Initiative                        | 21.47                        | -18.27                        | -23.62                       |
|  | Oral Communication                | 17.04                        | 3.46                          | 9.10                         |
|  | Problem Analysis                  | - 4.91                       | - 5.16                        | - 6.28                       |
|  | Planning & Organizing             | - 6.74                       | - 6.92                        | - 6.44                       |
|  | Leadership                        | - 3.86                       | - 6.62                        | - 5.97                       |
|  | Interpersonal Relations           | -16.96                       | -15.35                        | 16.22                        |
| Interpersonal-<br>Interaction<br>Exercises | Decision Making                   | 11.73                        | 14.28                         | 8.07                         |
|  | Decisiveness                      | - 1.63                       | 18.32                         | -11.58                       |
|  | Initiative                        | -20.32                       | - 6.05                        | -23.09                       |
|  | Oral Communication                | 12.20                        | 17.43                         | 12.60                        |
|  | Problem Analysis                  | 11.93                        | 7.66                          | 13.74                        |
|  | Planning & Organizing             | 18.38                        | 18.93                         | - 3.07                       |
|  | Leadership                        | - 4.61                       | 0.53                          | 13.07                        |
|  | Interpersonal Relations           | 24.91                        | - 1.46                        | -20.82                       |

presumably to facilitate social factors.

The second person factor represented persons who saw no task attributes which stood out strongly in the In-basket as needing attention and saw very little need for initiative or for attention to interpersonal relations in that setting. On the other hand, in the group or more interpersonally oriented settings, this person was represented by a strong emphasis on action and communicating these ideas to others. To these individuals, in these exercises with interaction requirements, it was important to be decisive, make decisions, plan and organize others and communicate their desires effectively to others.

The final subject factor represented those who, on the In-basket saw little need to take initiative but were concerned about interpersonal relations. On interpersonal tasks, they still perceived a low requirement for taking initiative but also saw little need for interpersonal relations. To them, oral communications and problem analysis were most important in this setting.

#### Individual Difference Effects

Once groups of individuals similar in their perceptions of the attributes required in given exercise settings had been identified through the three mode factor analysis, subsequent analyses were performed to determine if group so defined shared other characteristics. The remainder of the analyses explored these possibilities. To do this, the sample was divided into three groups on the basis of each individual's loading on the varimax rotated factors of the person space. Each candidate was identified with the group for which his factor loading was highest. For the 127 candidates, 58 loaded highest on the first person factor, 20 on the second and 49 on the third.

The first analysis with the three groups investigated whether the individual demographic and personality measures obtained from each



candidate were systematically related to group membership. A discriminant analysis was run on all the variables from the three sets with the three groups. None of the discriminant functions were significant.

A second set of analyses investigated the effect of grouping according to individual differences in task attribute importance perceptions on performance in the center. Sixteen performance ratings were obtained from the assessors as part of the candidate's final report from the center. Table 8 reports the means for the three groups on the sixteen performance dimensions plus an overall measure which was simply the sum of the sixteen ratings. The performance dimensions were grouped in Table 8 according to whether or not the specific performance dimension was represented by task attribute items on the Exercise Requirement Scale. Since groups were created on the basis of task attributes described on the scale, it was predicted that differences in performance across groups should be more likely among performance measures which matched the attributes measured. Table 8 shows this was the case. On three of the eight performance dimensions represented on the Exercise Requirements Scale, the groups differed significantly in their performance. The differences also held up for the overall performance measure. In general, the performance differences indicated that Group 1 individuals, on the average, performed lower than Groups 2 and 3, and Groups 2 and 3 performed very similarly with Group 2 slightly, but not significantly, better than Group 3.

The final set of analyses looked at motivational effects on performance. Motivation in the center was defined according to Expectancy theory as E<sub>II</sub>V and termed motivational force. Table 9 presents the correlation of motivational force with each of the sixteen performance dimensions and with the sum across all performance measures. These correlations were calculated for the whole sample and within each of the three groups of individuals.

Table 8  
Mean Behavior Ratings on the Sixteen Performance Dimensions  
Assessed by the Assessors

|   | PERSON GROUPS |         |        |                    |       |
|---|---------------|---------|--------|--------------------|-------|
| Performance Dimensions                            | 1             | 2       | 3      | F <sub>2,124</sub> | p     |
| I. Those Corresponding to Task Attribute Measures |               |         |        |                    |       |
| Decision-Making                                   | 23.90         | 25.85   | 26.30  | 1.92               | n.s.  |
| Decisiveness                                      | 28.91         | 33.35   | 30.88  | 2.65               | n.s.  |
| Initiative  | 27.10         | 31.00   | 30.06  | 3.10               | ≤ .05 |
| Oral Communications                               | 30.98         | 34.00   | 32.80  | 1.76               | n.s.  |
| Problem Analysis                                  | 24.29         | 28.20   | 26.76  | 2.49               | n.s.  |
| Planning & Organizing                             | 24.26         | 30.00   | 28.94  | 7.15               | ≤ .01 |
| Leadership  | 23.91         | 28.65   | 28.04  | 4.18               | ≤ .01 |
| Sensitivity (Inter-personal Relations)            | 25.84         | 28.30   | 28.10  | 1.76               | n.s.  |
| II. Other Performance Dimensions                  |               |         |        |                    |       |
| Oral Presentation                                 | 28.90         | 31.50   | 31.84  | 2.38               | n.s.  |
| Written Communication                             | 26.90         | 29.20   | 30.10  | 2.65               | n.s.  |
| Stress Tolerance                                  | 29.81         | 31.85   | 31.64  | 1.19               | n.s.  |
| Tenacity  | 28.47         | 31.95   | 30.47  | 1.93               | n.s.  |
| Risk Taking                                       | 22.81         | 25.50   | 24.06  | 1.37               | n.s.  |
| Management Control                                | 23.22         | 25.35   | 25.45  | 0.97               | n.s.  |
| Delegation  | 26.05         | 30.00   | 26.98  | 0.97               | n.s.  |
| Responsiveness                                    | 29.12         | 30.20   | 29.94  | 0.38               | n.s.  |
| III. Overall Performance - Sum of all Measures    |               |         |        |                    |       |
|   | 821.98        | 1052.20 | 951.49 | 4.37               | < .01 |

Table 9  
Motivational Force as Defined by Expectancy Theory  
Predicting Performance Ratings

| Performance Dimensions                               | Total<br>Sample<br>(N=127) | Correlations of Performance Ratings<br>with Motivational Force |             |             |
|--|----------------------------|--|-------------|-------------|
|  |                            | PERSON GROUPS  |             |             |
|  |                            | 1<br>(N=58)  | 2<br>(N=20) | 3<br>(N=49) |
| I. Those Corresponding to<br>Task Attribute Measures |                            |  |             |             |
| Decision-Making                                      | .24**                      | .39**  | .00         | .11         |
| Decisiveness   | -.02                       | .05  | -.10        | -.10        |
| Initiative   | .17*                       | .30**  | -.03        | .04         |
| Oral Communications                                  | .19*                       | .28*   | .22         | .04         |
| Problem Analysis                                     | .16*                       | .37**  | -.05        | -.04        |
| Planning & Organizing                                | .14                        | .39**  | -.08        | -.10        |
| Leadership   | .14                        | .18  | .29         | -.01        |
| Sensitivity (Inter-<br>personal Relations)           | .10                        | .18  | -.36        | .05         |
| II. Other Performance Dimensions                     |                            |  |             |             |
| Oral Presentation                                    | .09                        | .19  | .11         | -.07        |
| Written Communication                                | .09                        | .24*   | -.11        | -.03        |
| Stress Tolerance                                     | .08                        | .32**  | .15         | -.14        |
| Tenacity   | .02                        | .07  | .34         | -.16        |
| Risk Taking  | .09                        | .22*   | -.04        | -.05        |
| Managerial Control                                   | .12                        | .23*   | -.17        | .08         |
| Delegation   | .09                        | .27*   | -.14        | -.07        |
| Responsiveness                                       | .02                        | .16  | -.28        | -.08        |
| III. Overall Performance - Sum<br>of all Measures    | .16*                       | .37**  | -.02        | -.05        |

It is evident from Table 9 that motivational force was related to performance for several performance dimensions but that this relationship was almost entirely within those individuals defined to be in Group 1. For Group 1 individuals, their performance on ten of the sixteen dimensions as well as their overall performance correlated significantly with motivational force.

Given the method of data collection for motivational force measures and performance measures, it is possible to infer that the causal link between these variables was from motivation to performance. Variables used to assess motivational force were obtained soon after the center was begun and before the candidates were fully aware of the nature of the exercises or had any way to judge their own performance on the exercises. Therefore, the Expectancy theory measures did not reflect judgments about their own performance. Thus, the correlations indicated that those in Group 1 who anticipated that higher levels of effort would lead to a greater likelihood of receiving valued outcomes and avoiding negative outcomes apparently put forth more effort and did better.

### Discussion

The three-mode factor analysis clearly indicated that both individual and exercise factors influenced the variance in individual's perceptions of what was important for successful performance on the exercises of the assessment center. Descriptions of the nature of the impact of each major set appears in the results section and need not be repeated here. It suffices to say that the exercise and task attribute factors clustered in a manner closely matching the general descriptions of the exercises and fit quite closely what would be expected from descriptions of exercises (See Tables 2 and 4). For individuals, on the other hand, no a priori expectations were

available for suggesting how individuals might differ on their views of the important task attributes for successful performance. Therefore, the descriptions of individual types based upon the pattern of loadings in Table 7 have few external criteria against which to evaluate their appropriateness.

The major contribution of the groups of individuals identified by means of the three-mode factor analysis lies not in the description of the ideal person types but in the fact that persons identified as belonging to these groups reacted differently to other variables in the assessment center. Specifically, final performance ratings were related to group membership in several cases. Also, the contribution of motivation to final performance varied with group membership.

A comparison of Table 8 with Table 9 shows that performance was higher in Groups 2 and 3 than in Group 1, but performance was only predictable from motivational force for Group 1. The fact that the group for which the motivational model predicted performance best also was the poorest performing group was not expected, yet, these results are not contradictory. Although performance had a larger motivational component for members of Group 1, the overall performance need not be higher for the group. It is possible that members of Groups 2 or 3 may have possessed more skill at the tasks presented and, therefore, their performance was higher in spite of the fact that it was less influenced by motivation. They also may have more accurately perceived the exercise dimensions relevant to successful task performance and, as a result, been more efficient in the use of their time in a center.

To explore the accuracy interpretation, assessor scores on the Exercise Requirements Scale were used. Accuracy of perceptions on a given attribute was defined as the simple difference between the candidate's rating of the attribute's importance on a given exercise with the mean rating of the assessors subtracted from it. Assessor ratings of attributes were compared

across centers by treating centers as levels in a one-way ANOVA and no significant center effect was found. Therefore, the mean rating was calculated across all assessors.

Table 10 presents the means and univariate  $F$ s for the accuracy scores for the eight task attributes on the four exercises. The three groups differed significantly on their degree of accuracy on twenty-two of the thirty-two dimensions. No group was clearly more accurate than any other group. However, an inspection of the ranking of the absolute value of the differences implied that Group 1 was somewhat more accurate on the non-assigned role exercise and that Groups 2 and 3 tended to be more accurate on the other three. This pattern tended to support the interpretation that the groups two and three may have performed higher with less effort due to more efficient use of their time. Nevertheless, the tentativeness of this conclusion from Table 10 cannot be overemphasized.

Finally, note should be made of the methods of analyses employed by the present study. Typically, when multivariate analyses are employed to capture the complexity of human behavior, the final step in the analysis is to label the dimensions and interpret them based upon their labels. Although acceptable, this often leads to overinterpretation due to failure to take into account the lack of stability when optimally fitting data points based upon measures with less than perfect reliabilities. In addition, it frequently leads to the interpretation of complex variates that bear little resemblance to identifiable characteristics of people or job environments. As such, they may possess little ability for advancing the understanding of human behavior in organizations.

To have ceased our investigation with an interpretation of the three-mode would have subjected this study to exactly the same criticisms leveled above. However, the demonstration that individual person types, empirically

Table 10  
Mean Accuracy Comparisons for the Three Groups  
of Persons Defined by the Three-Mode

|                            |                         | Means for Each Group |                |                | F     | p     |
|----------------------------|-------------------------|----------------------|----------------|----------------|-------|-------|
| Exercise                   | Dimension               | S <sub>1</sub>       | S <sub>2</sub> | S <sub>3</sub> |       |       |
| Non-Assigned<br>Role Group | Decision Making         | 20.59                | 107.45         | 31.82          | 2.69  | n.s.  |
|                            | Decisiveness            | - 23.31              | 274.00         | - 55.84        | 25.14 | < .01 |
|                            | Initiative              | 35.21                | 134.50         | - 29.98        | 8.87  | < .01 |
|                            | Oral Communication      | - 61.93              | 72.25          | -159.57        | 16.22 | < .01 |
|                            | Problem Analysis        | 40.71                | 58.90          | 7.73           | 1.76  | n.s.  |
|                            | Planning & Organizing   | 68.19                | 146.50         | - 14.06        | 5.39  | < .01 |
|                            | Leadership              | - 20.05              | 131.60         | - 73.14        | 14.46 | < .01 |
|                            | Interpersonal Relations | 106.59               | - 13.35        | -163.43        | 27.40 | < .01 |
| In-Basket                  | Decision Making         | -171.09              | -137.30        | -206.10        | 4.09  | < .05 |
|                            | Decisiveness            | 165.34               | 108.00         | 53.57          | 9.68  | < .01 |
|                            | Initiative              | -177.41              | -246.40        | -259.76        | 9.56  | < .01 |
|                            | Oral Communication      | 246.12               | 251.65         | 195.73         | 3.84  | < .05 |
|                            | Problem Analysis        | -120.22              | -145.30        | -194.80        | 6.60  | < .01 |
|                            | Planning & Organizing   | -341.05              | -308.20        | -364.51        | 2.19  | n.s.  |
|                            | Leadership              | 278.03               | 194.70         | 189.61         | 9.12  | < .01 |
|                            | Interpersonal Relations | -344.00              | -288.35        | -344.41        | 1.06  | n.s.  |
| Assigned<br>Role Group     | Decision Making         | 8.09                 | 29.40          | 45.96          | 1.28  | n.s.  |
|                            | Decisiveness            | 14.03                | 163.00         | - 23.53        | 11.54 | < .01 |
|                            | Initiative              | 29.29                | 50.15          | 11.59          | 0.82  | n.s.  |
|                            | Oral Communication      | - 15.41              | - 14.00        | -102.24        | 6.54  | < .01 |
|                            | Problem Analysis        | 36.87                | 42.10          | - 18.41        | 4.20  | < .05 |
|                            | Planning & Organizing   | 55.95                | - 11.30        | - 16.24        | 5.60  | < .01 |
|                            | Leadership              | 10.88                | 19.95          | 24.94          | 1.61  | n.s.  |
|                            | Interpersonal Relations | 107.62               | - 36.71        | -128.53        | 25.61 | < .01 |
| Analysis<br>Problem        | Decision Making         | - 19.81              | 11.05          | 2.78           | 0.73  | n.s.  |
|                            | Decisiveness            | - 47.93              | 98.00          | - 88.37        | 12.64 | < .01 |
|                            | Initiative              | 36.71                | 33.60          | - 5.96         | 2.19  | n.s.  |
|                            | Oral Communication      | 28.21                | 10.50          | - 44.41        | 5.60  | < .01 |
|                            | Problem Analysis        | 65.55                | - 7.00         | - 10.63        | 7.23  | < .01 |
|                            | Planning & Organizing   | 10.31                | - 14.20        | - 0.10         | 0.45  | n.s.  |
|                            | Leadership              | 152.98               | 8.20           | 31.84          | 18.91 | < .01 |
|                            | Interpersonal Relations | 244.29               | -107.30        | -102.92        | 63.24 | < .01 |

<sup>1</sup> The smaller the absolute value of the discrepancy, the more accurate the importance rating on the attribute.

defined by multivariate procedures which took into account the interaction between persons and situations, could be used to show systematic differences in responses to the situation, eliminates the possibility that the groups were meaningless or irrelevant. It is suggested that a combination multivariate procedures which build on each other provides a fruitful avenue for research.

To have had a better understanding of the person types identified in the three-mode analysis, it would have been helpful if the individual difference measures had been related to types of persons. The discriminant analysis of these variables showed no difference between groups. The lack of support for this analysis may have been due to inappropriate individual difference measures. For example, the demographic variables were age, educational level, and number of years with the organization. Yet, there appears to be few reasons to expect, from a theoretical standpoint, these variables to have affected perceptions.

From a theoretical standpoint, the most likely influence on work role perceptions would be the frame-of-reference of the individual and the perceptual set created by that frame-of-reference. Newman (1975) showed that frames-of-reference strongly influenced the perceptions of insurance agents' work environment and, in turn, their attitudes toward the task. Unfortunately, none of the individual differences measured in the present study could have been construed to reflect frame-of-reference. It is suggested that further research on perceptual differences among individuals choose individual differences such as career fields, which more closely reflect frames-of-reference.

The research summary and conclusion clearly demonstrated that the perception of the relevance of various task attributes depends upon both the task and the individual. Furthermore, types of individuals identified on the



basis of their perceptions of the task differed in their behavior on the task and the extent to which their behavior was a function of their motivation.

Since reactions to tasks are not to the tasks themselves but the task as perceived or redefined (Hackman, 1969) by the individuals, it is important that individuals who perceive tasks similarly be identified. Then change attempts can be aimed at changing tasks in such a way as to create the desired perceptions. The present research indicated the individuals can be clustered on the basis of their perceptions and that, when clustered on the basis of similar perceptual patterns, they respond differently to jobs. It was suggested that continued efforts be made to identify persons with similar work role perceptions in order to improve the effectiveness of influence attempts in organizations.

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